



NOAA Environmental Visualization Program's Educational Collection Animation Descriptions and Teacher's Guide

NESDIS/STAR

About NOAA Satellites

The National Oceanic and Atmospheric Administration (NOAA), in collaboration with NASA and the U.S. Air Force, is responsible for operating a fleet of weather and environmental monitoring satellites. These satellites may be grouped by how they orbit the Earth. Geostationary satellites orbit the Earth at a speed equal to its rotation, so they seem to stay in place. They provide constant monitoring of specific areas of the globe. NOAA currently operates four geostationary satellites: GOES-10, GOES-11, GOES-12, and GOES-13. GOES stands for *Geostationary Operational Environmental Satellites*. These satellites provide constant coverage of the western hemisphere, taking images every 15 minutes. They also have sensors that can detect cloud, land, and ocean temperatures, as well as features of the sun. The other group of satellites are called polar orbiters, because they make 360° orbits around the Earth from pole to pole. It takes approximately 1.5 hours to make one orbit, so in 24 hours, the 14 orbits of each polar satellite provide global coverage of the earth. Though these satellites do not provide constant coverage of one area, they have a variety of high resolution sensors that provide information about global temperatures, winds, topography, and clouds. NOAA is currently combining its POES satellites (Polar Operational Environmental Satellites) with the NASA and U.S. Air Force polar orbiting satellites into a combined system called NPOESS (National Polar-orbiting Operational Environmental Satellite System). This integrated system will become an important component of the globally integrated Global Observation System of Systems (GEOSS)

Animation of Geostationary versus Polar-orbiting satellites

http://www.nnvl.noaa.gov/education/animations/Geo_vs_Polar.wmv

Animation of NOAA GOES and POES satellites in actual orbits

http://www.nnvl.noaa.gov/education/animations/NOAA_DMSP.wmv

Animation of the GEOSS environmental satellites

<http://www.nnvl.noaa.gov/education/animations/GEOSS.wmv>

Global Sea Surface Temperature Animation

<http://www.nnvl.noaa.gov/education/animations/SST.mpg>

Description: This animation shows the heating and cooling of the world's oceans over the course of three years. Warm colors (orange, red) indicate warm temperatures; cool colors (blue, purple) indicate cold temperatures. Visible is the extremely intense El Niño of 2003-2006. It can be identified by an undulating band of green color around the equatorial region off of South America. Another characteristic of the La Niña is the extremely warm ocean temperatures of the West Pacific and Atlantic oceans. Also visible is the fluctuations in the distribution of sea ice (dark grey) around the poles.

The images were produced from temperature sensors aboard NOAA's fleet of geostationary and polar orbiting satellites. This data is crucial for such activities as monitoring the health of marine ecosystems, detecting the start of El Niño or La Niña, monitoring the threat of ice bergs, and providing data on the potential for severe hurricanes.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Imagery - remotely sensed, Visualization - scientific

Subjects: Climatology, Environmental science, Natural hazards, Physical oceanography, Space science

Tsunami animation

<http://www.nnvl.noaa.gov/education/animations/Tsunami.mpg>

Description: This animation shows the wave propagation from the June 10, 1996 tsunami that formed off of Andreanov Island in the Aleutian Archipelago off Alaska. Also depicted are the Deep ocean Assessment and Reporting of Tsunami (DART) buoys that are used by National Oceanic and Atmospheric Administration (NOAA) to detect and alert the public to the presence of tsunami threats. An interesting enhancement of this animation, originally provided by the NOAA Pacific Marine Environment Laboratory, is the underlying ocean topography. You can see how the waves interact with ocean bottom features.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Illustration - scientific, Imagery - remotely sensed, Visualization - scientific

Subjects: Environmental science, Natural hazards, Physical geography, Space science

Global Topography Animation

<http://www.nnvl.noaa.gov/education/animations/Bathymetry.mpg>

Description: This 3-D rotating globe animation displays satellite altimetry data showing the topographic features of the continents and oceans. The data was compiled from the U.S. Navy GEOSAT (Geodetic/Geophysical Satellite) and European Space Agency's ERS-1 satellites, as well as information from high resolution ship-based soundings of the ocean floor.

Try to identify 1. tectonic plate margins, 2. Marianas Trench, 3. Hawaiian Islands undersea mountain chain, 4. Mid-Atlantic ridge, 5. Areas of divergence, convergence, and transform-faults. NOTE: This is a large file, greater than 20mb in size.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Imagery - remotely sensed, Visualization - scientific

Subjects: Geology, Physical geography, Space science

Satellite Animation of Tornado Imagery

http://www.nnvl.noaa.gov/education/animations/March_2006_Illinois_Tornado.mpg

Description: Between 8:20 and 8:30 PM on March 12, 2006, the city of Springfield, IL, was affected by a pair of F2-strength tornadoes. These tornadoes killed 2 people, injured 50, and caused \$2.5 million in damage. The NOAA GOES-12 satellite captured infrared imagery of the system as it moved across the plains. Using color enhancements, the rapid intensification of the storm is evident. In this color scheme "cold" blue colors indicate stronger storm intensity. Though the actual tornadoes are not visible, though the intense storm system that spawned them can be seen.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Imagery - remotely sensed, Visualization - scientific

Subjects: Atmospheric science, Natural hazards

Sea Surface Winds Animation

<http://www.nnvl.noaa.gov/education/animations/Ocean-Winds.mpg>

Description: This animation shows the sea surface winds captured by the SSM/I (Special Sensor Microwave Imager) aboard the U.S. Air Force-NOAA DMSP weather satellite. The most intense winds are characterized by "hot"/red colors, less intense winds by "cool"/blue colors. Question: How do these satellite-observed winds compare to illustrated wind patterns over the globe? The DMSP is a polar orbiting satellite, meaning it makes earth orbits from pole to pole, capturing images and information as the earth rotates on its axis below. Because of this orbit, the satellite passes the same location twice a day, gathering information from the entire globe. However, notice the data gaps (black) since some areas are not covered by the polar orbits.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Imagery - remotely sensed, Visualization - scientific

Subjects: Atmospheric science, Climatology, Environmental science, Physical oceanography

Hurricane Season 2005 Animation

http://www.nnvl.noaa.gov/education/animations/Hurricanes_2005.mpg

Description: This animation shows all of the cyclonic activity associated with the 2005 hurricane season from June to November. The 2005 hurricane season was a record breaker: the most named storms, three of the six most intense storms on record, the latest forming storm, and the most costly season in property damages. The infrared imagery was captured by the National Oceanic and Atmospheric Administration (NOAA) GOES-12 satellite with 4km resolution. Names of all of the tropical storms and hurricanes are included in the animation. NOTE: This is a large file, greater than 50mb in size.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Imagery - remotely sensed, Visualization - scientific

Subjects: Atmospheric science, Natural hazards

Colorized Infrared Animation of Hurricane Katrina

http://www.nnvl.noaa.gov/education/animations/Katrina_IR.mpg

Description: Colorized satellite infrared (IR) imagery was used to show the relative intensity of Hurricane Katrina as it moves towards the U.S. coast during August of 2005. White colors indicate the cold, high elevated clouds that are associated with the most intense storm activity. Green colors are the low-level, warmer cloud tops that are less intense. Again, notice how rapidly the storm reorganizes and intensifies once it reaches the warm waters of the Gulf of Mexico.

Grade ranges: Middle (6-8), High (9-12), College (13-14), General public

Resource types: Imagery - remotely sensed, Visualization - scientific

Subjects: Atmospheric science, Natural hazards, Space science

Animation of Hurricane Hunter Airplane

<http://www.nnvl.noaa.gov/education/animations/Hurricane-Hunter.mpg>

Description: During tropical storm and hurricane activity, National Oceanic and Atmospheric Administration (NOAA) flies aircraft into the storms to acquire highly accurate data on wind speeds, pressure, etc. This animation overlays the flight paths of two hurricane hunter missions during Hurricane Michelle (November 2001). NOTE: This is a large file, greater than 20mb in size.

Grade ranges: Middle (6-8), High (9-12), College (13-14)

Resource types: Illustration - scientific, Visualization - scientific

Subjects: Atmospheric science, Natural hazards